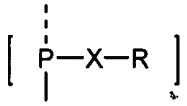
AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of the Claims

1. (Currently Amended) A microarray comprising a plurality of microlocations, wherein the microlocations each comprise an underlying working microelectrode on a substrate, wherein at least some of the microelectrodes are covered by a permeation layer comprising at least a first chemical group for attaching biomolecules to the microarray, the first group having the formula:



wherein,

P is a polymerizable moiety covalently attached to one or two moieties selected from the group consisting of a monomeric unit of the permeation layer and another P-X-R group, as defined herein, wherein the other P-X-R group may be the same as or different from the first P-X-R group, further wherein the dashed line is a covalent bond to the second moiety if P is covalently attached to two moieties;

X is a covalent bond or a linking moiety; and

R is a functional moiety for attaching, either covalently or non-covalently, a ~~derivatized~~ biomolecule, ~~or for attaching covalently another P-X-R group, as defined herein, wherein the other P-X-R group may be the same as or different from the first P-X-R group, wherein R may, optionally, be attached to a biomolecule or another P-X-R group,~~ wherein R is activated

by a chemical transformation caused by a pH change in an overlying solution generated by providing an electronic potential at at least one electrode of the microarray before reacting with the ~~biomolecules~~ biomolecule, and wherein **R** is selected from the group consisting of acetals, ketals, imines, TBOC, FMOC, trityl, trifluoroacetamide, and esters. ~~streptavidin, a portion of streptavidin, biotin, phenyl boronic acid, salicylic hydroxamic acid, acetal, and thioester moieties.~~

2-6. (Canceled)

7. (Previously Presented) The microarray of claim **1** wherein **P** is covalently attached to at least one other P-X-R group, further wherein the **P** is covalently attached to the **P** moiety of the at least one other P-X-R group.

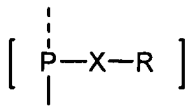
8. (Previously Presented) The microarray of claim **7** wherein the at least one other P-X-R group is a portion of a polymer, wherein a backbone of the polymer comprises the **P** moieties of a plurality of P-X-R groups covalently attached to one another.

9. (Previously Presented) The microarray of claim **8** wherein the P and/or R moieties of the first P-X-R group and the P-X-R groups in the polymer backbone are the same.

10-12. (Canceled)

13. (Previously Presented) The microarray of claim **1** wherein **X** is selected from the group consisting of a covalent bond, an alkyl group of 1-10 carbon atoms, an alkenyl group of 2-10 carbon atoms, alkyl esters, ketones, amides, ethers, thioesters, amido groups, carbonyls, and any combinations thereof.

14. (Currently Amended) A microarray comprising a plurality of microlocations, wherein the microlocations each comprise an underlying working microelectrode on a substrate, wherein at least some of the microelectrodes are covered by a permeation layer comprising first and second chemical groups having the formula



wherein,

the dashed line is a covalent bond to a second moiety if P is covalently attached to two moieties

P is a polymerizable moiety,

X is a linking moiety selected from the group consisting of a covalent bond, an alkyl group of 1-10 carbon atoms, an alkenyl group of 2-10 carbon atoms, alkyl esters, ketones, ethers amides, thioesters, amido groups, carbonyls, and any combinations thereof; and

R is a functional moiety for attaching, either covalently or non-covalently, a ~~derivatized~~ biomolecule, and wherein R is activated by a chemical transformation caused by a pH change in an overlying solution generated by providing an electronic potential at at least one electrode of the microarray before reacting with the ~~biomolecules~~ biomolecule, and wherein **R** is selected from the group consisting of acetals, ketals, imines, TBOC, FMOC, trityl, trifluoroacetamide, and esters ~~streptavidin, a portion of streptavidin, biotin, phenyl boronic acid, salicylic hydroxamic acid, acetal, and thioester moieties~~;

wherein the first and second P-X-R groups may be the same or different;

wherein the **P** moieties of the first P-X-R groups are covalently attached to the permeation layer matrix and to one **P** of the second P-X-R groups;

wherein the **P** moieties of the second P-X-R groups are covalently attached to one or two other **P** moieties of other second P-X-R groups to form a polymer of the second P-X-R groups.

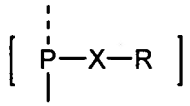
15. (Canceled)

16. (Previously Presented) The microarray of claim 14 wherein **R** are the same for the first and second P-X-R groups.

17. (Previously Presented) The microarray of claim **14** wherein **P** of the first and/or second P-X-R groups require activation prior to participating in a polymerization reaction, wherein the activation is either under the same or mutually exclusive conditions.

18-27. (Canceled)

28. (Currently Amended) A microarray comprising a plurality of microlocations, wherein the microlocations each comprise an underlying working microelectrode on a substrate, wherein at least some of the microelectrodes are covered by a permeation layer comprising first P-X-R groups attached to one or two moieties selected from the group consisting of biomolecules and polymerized monomer units comprising second P-X-R groups, wherein the polymerized second P-X-R groups are further attached to biomolecules, wherein the attachment of the biomolecules to the first P-X-R groups or to the polymerized second P-X-R groups requires activation of at least one of the first and/or the second P-X-R groups under acidic and/or basic pH conditions, wherein the first and second P-X-R groups have the formula



wherein,

the dashed line is a covalent bond to a second moiety if P is covalently attached to two moieties;

P is a polymerizable moiety, wherein;

X is a linking moiety selected from the group consisting of a covalent bond, an alkyl group of 1-10 carbon atoms, an alkenyl group of 2-10 carbon atoms, alkyl esters, ketones, ethers amides, thioesters, amido groups, carbonyls, and any combinations thereof; and

R is a functional moiety for attaching, either covalently or non-covalently, a ~~derivatized~~ biomolecule or for attaching covalently another P-X-R group;

wherein **P** comprises a chemical element requiring activation for attaching to the permeation layer and/or to a **P** of an other P-X-R group;

wherein **R** comprises chemical elements requiring activation by a chemical transformation caused by a pH change in an overlying solution different from **P** of either the first or second P-X-R groups for attaching to biomolecules~~, or to P of another P-X-R groups, before~~

~~reacting with the biomolecules, and wherein **R** is selected from the group consisting of streptavidin, a portion of streptavidin, biotin, phenyl boronic acid, salicylic hydroxamic acid, acetal, and thioester moieties; and~~

wherein the pH change is produced by a method selected from the group consisting of contacting the electronic microarray with a buffer of the appropriate pH, applying an electronic potential at at least one electrode of the electronically addressable microarray to alter the pH, and combinations thereof[[.]], and

wherein an electronic potential used to alter the pH is applied at a current density of between 50 nA/5000μm^2 and 5 $\mu A/5000\mu m^2$ at the at least one electrode for a time period between 30 and 600 seconds.

29. (Previously Presented) The microarray of claim **28** wherein the permeation layer comprises a polymer polymerized from a monomer selected from the group consisting of acrylamide, bisacrylamide, methacrylamide, *N*-alkyl acrylamides, functionalized ethylene glycol derivatives, *N*-vinyl pyrrolidinone, bis-cystamine, acrylates, methacrylates, and acrylonitriles.

30. (Currently Amended) The microarray of claim **28** wherein the biomolecules are further derivatized with a chemical moiety selected from the group consisting of vinyl, allyl, homoallyl, acetal, ester, carboxylic acid, amide, halo-acetamide, thiol, phosphorothiolate monoester, thioester, disulfide, aldehyde, ketone, hydrazide, hydrazine, and amines.

31. (Previously Presented) The microarray of claim **28** wherein **P** for the first and second P-X-R groups are, independently, selected from the group consisting of alkenyl moieties, α,β-unsaturated carbonyls, vinyl, allyl and homoallyl groups, acetal, thioester, disulfide, epoxides, alkyl ether, and carboxylic acid moieties.

32. (Previously Presented) The microarray of claim **28** wherein the **X** for the first and second P-X-R groups are, independently, selected from the group consisting of a covalent bond, a carbon chain consisting of 1 to 10 carbons, ethers, polyethers, amides, and esters.

33. (Canceled)

34. (Previously Presented) The microarray of claim 28 wherein the **R** is the same for the first and second P-X-R groups.

35. (Canceled)

36. (Previously Presented) The microarray of claim **28** wherein **R** for the first and second P-X-R groups are thioester moieties.

37. (Previously Presented) The microarray of claim **28** wherein **R** for the first and second P-X-R groups are acetal moieties.

38-66. (Canceled)

67. (Previously Presented) The microarray of claim **1** wherein **P** is selected from the group consisting of an acetal, epoxide, ester, carboxylic acid, amide, halo-acetamide, thiol, phosphorothiolate monoester, thioester, disulfide, aldehyde, ketone, hydrazide, hydrazine, and amine moieties.

68-71. (Canceled)

72. (Previously Presented) The microarray of claim **14** wherein **P** is selected from the group consisting of alkenyl, α,β-unsaturated carbonyl, vinyl, allyl, and homoallyl moieties.

73. (Previously Presented) The microarray of claim **14** wherein **P** is selected from the group consisting of an acetal, epoxide, ester, carboxylic acid, amide, halo-acetamide, thiol, phosphorothiolate monoester, thioester, disulfide, aldehyde, ketone, hydrazide, hydrazine, and amine moieties.

74-77. (Canceled)

78. (Previously Presented) The microarray of claim **14** wherein the **R** moieties of the first and/or second P-X-R groups require activation prior to covalent attachment to a biomolecule, wherein the activation is either under the same or mutually exclusive conditions for the first and second groups.

79. (Previously Presented) The microarray of claim **78** wherein the activation is by basic or acidic conditions.

80. (Previously Presented) The microarray of claim **79** wherein the basic or acidic conditions required for activation may be produced by applying an electronic potential at at least one electrode of the electronically addressable microarray.

81-86. (Canceled)

87. (Previously Presented) The microarray of claim **1** wherein the permeation layer comprises a polymer polymerized from a monomer selected from the group consisting of acrylamide, bisacrylamide, methacrylamide, *N*-alkyl acrylamides, functionalized ethylene glycol derivatives, *N*-vinyl pyrrolidinone, bis-cystamine, acrylates, methacrylates, and acrylonitriles.

88. (Previously Presented) The microarray of claim **14** wherein the permeation layer comprises a polymer polymerized from a monomer selected from the group consisting of acrylamide, bisacrylamide, methacrylamide, *N*-alkyl acrylamides, functionalized ethylene glycol derivatives, *N*-vinyl pyrrolidinone, bis-cystamine, acrylates, methacrylates, and acrylonitriles.

89. (Canceled)

90. (New) The microarray of claim 1, wherein R is a thioester.

91. (New) The microarray of claim 14, wherein R is a thioester.

92. (New) The microarry of claim 28, wherein R is selected from the group consisting of acetals, ketals, imines, TBOC, FMOC, trityl, trifluoroacetamide, and esters.

93. (New) The microarry of claim 28, wherein R is a thioester.